Œdionychis Chevrolatii.

Œ. late ovata, convexa, nitida; subtus, cum capite (encarpis flavis exceptis), nigra, abdomine piceo, margine externo segmentorumque marginibus pallidioribus; supra flava; thorace lævi, impunctato; scutello trigonato, nigro; elytris sat remote, tenuiter punctatis, utrinque vitta suturali, altera submarginali, his apice conjunctis, tertiaque discoidali, paullo ante apicem abbreviata, nigro-cyaneis; limbo exteriore angusto piceo.

Long. 3 lin.

Hab. Mexico.

Vertex smooth, impunctate; inner orbit of eye and the upper surface of the front impressed with large, round punctures; lower portion of front very finely strigate; encarpæ separated from the front by a distinct transverse groove, subquadrangular, pale fulvous; carina strongly elevated; second and third joints of antennæ nearly equal in length. Thorax three times as broad as long; sides nearly straight, very slightly converging behind the middle, thence converging and slightly rounded to the apex; anterior angles mucronate; basal margin bisinuate on either side, the median portion not produced, obtusely truncate; upper surface shining, impunctate; lateral margin broadly reflexed. Scutellum trigonate, its apex acute. Elytra broader than the thorax, increasing in breadth from the base towards the apex, the latter broadly rounded; above moderately convex, longitudinally excavated along the base of the suture, the depressed surface rather strongly and coarsely punctured.

[To be continued.]

XXXVI.—*Studies on the Hydroida.*

By C. Mereschkowsky.

[Continued from p. 256.]

III. *Systematic Facts.*

As I am now busy preparing a complete description of all the Hydroids occurring in the Russian seas, which will shortly appear in my native language, I shall here give simply a list of the species which I have met with in my two visits to the White Sea, and only describe a few of the new species and the new genera. The deficiency of material in respect of Hydroids in our zoological museums sometimes renders the determination of the species very difficult, and in some cases rather doubtful; for frequently it is very desirable to compare two specimens, one of which is already determined. But I

hope to be able to procure in England specimens of the most desirable species in exchange for my own, which will enable me to verify my determinations. At any rate, I shall attach a note of interrogation to any species that is in the least degree doubtful. The species are as follows:—

Suborder Athecata.

1. *Oorhiza borealis*, nov. gen. et nov. sp.
2. *Hydractinia*, sp. indet.
3. *Syncoryne Sarsii*: Medusæ (*Sarsia tubulifera*) in great numbers.
4. *Stauridium productum.*
5. *Eudendrium arbuscula* (?), S. W.
6. *E. minimum*, nov. sp.
7. *Bougainvillia paradoxa*, nov. sp.: the Medusæ only in very large numbers.
8. *Monobrachium parasitum*, mihi (see Ann. & Mag. Nat. Hist., September 1877).
9. *Tubularia simplex.*
10. *T. indivisa.*

Suborder Thecaphora.

11. *Obelia geniculata*, Linn.
12. *O. gelatinosa* (?), Pall.
13. *O. flabellata*, Hincks.
14. *Campanularia volubilis*, Linn.
15. *C. integra* (?), Macgillivray.
16. *C. verticillata*, Linn.
17. *C. neglecta*, Alder.
18. *Leptoscyphus Grigoriewi*, nov. sp.
19. *Lafoëa dumosa*, Sars.
20. *L. pocillum*, Hincks.
21. *Calycella syringa*, Linn.
22. *Cuspidella*, sp. indet.
23. *Salacia abietina*, Sars.
24. *Filellum serpens*, Hassall.
25. *Coppinia arcta*, Dalyell.
26. *Halecium Beanii* (?), Johnst.
27. *Halecium*, sp. indet.
28. *Sertularella gigantea*, mihi, = *S. polyzonias*, robust variety, of Sars and Hincks.
29. *S. tricuspidata*, Alder.
30. *S. rugosa*, Linn.
31. *Diphasia*, Agass., sp. indet.
32. *Sertularia pumila*, Linn.
33. *S. filicula*, Ellis & Sol.

34. *S. abietina*, Linn.
35. *S. argentea*, Ellis & Sol.
36. *S. albimaris*, nov. sp.
37. *Hydrallmania falcata*, Linn., var. *bidens*.
38. *Thuiaria thuja*.
39. *T. articulata* (?).
40. *Polyserias mirabilis*, Verrill.
41. *P. Hincksii*, nov. gen. et nov. sp.

Suborder Gymnochroa.

42. *Hydra oligactis*, in the fresh water of the isle of Solovetzky.

It will be seen that among the forty-two species there are about eight which are new; the Hydroid fauna of the White Sea is therefore a rather peculiar one. Besides this we also see that as regards its fauna the White Sea belongs to regions which are quite polar, more polar, in fact, than the north of Norway and even the Mourmansky bereg (north of Lapland). Thus, while the White Sea has no representative of the family Plumulariidæ, which is characteristic of the southern seas, and, on the other hand, has many representatives of the families Lafoëidæ, Coppiniidæ, and Sertulariidæ, the Mourmansky bereg has furnished magnificent specimens of *Antennularia antennina*, of which the Zoological Cabinet of St. Petersburg is in possession. The Baltic has several species in common with the White Sea; but all these species are represented in England, Germany, or Belgium; they have consequently been able to arrive there through the Cattegat and Skagerrack, without its being necessary to explain this fact by the assumption of a union between the two seas; so that, as far as the Hydroids are concerned, they do not present any facts in support of Lovén's hypothesis, which, moreover, has been much shaken by the investigations of Prof. O. Grimm, of St. Petersburg*. Lastly, on comparing this fauna with that of the north of the Pacific Ocean, as represented by Mr. Clark, and also by the collection of the Museum of the Academy of St. Petersburg, it will be seen that there are relations between these two faunas. The genus *Polyserias* is especially characteristic of the north of the Pacific (I am acquainted with three species of this genus from the sea of Ochotsk); and, as we see, the White Sea possesses two species, one of which is common (*Polyserias mirabilis*). Further, the presence of *Coppinia arcta*, *Lafoëa dumosa*, *Campanularia integra*, *Lafoëa pocillum*,

* O. Grimm, 'On the Fauna of the Baltic Sea and its Origin' (in Russian), 1877.

Calycella syringa, several *Sertulariæ*, *Sertularella rugosa* and *tricuspidata* proves that the fauna of the White Sea is only a special department of a circumpolar fauna.

From what we now know of the distribution of the Hydroids it may be seen that, in fact, there exists such a circumpolar fauna, on the one hand perfectly special, and on the other represented by species which also occur in Europe, in England, the Baltic, &c. It is always easy to recognize to which fauna a species must belong, from a consideration of its size: in its native place, in the country from which it started, the species will certainly appear in all its splendour and of its largest size; for it is there especially that the conditions of life are most favourable to it. Thus, among the Hydroids there are certain species which frequently occur in the north (Iceland, Greenland, Spitzbergen, &c.), and which are there distinguished from the same species obtained from England, for example, by their excessive size. It is clear, therefore, that the polar regions must be regarded as the native place of these species, as the starting-point from which they have spread southwards into warmer seas, which certainly must have had an effect upon them, rendering them feebler; and it is in this that I find the answer to the question raised by Hincks*, as to why this phenomenon is observed. But, on the other hand, it must not be forgotten that in the family Plumulariidæ there are species characteristic of the southern seas of gigantic size, as, for example, that described by M. Semper†, which proves that the native place and starting-point of all these Hydroids must be regarded as in southern regions; and it is very probable that the further to the north they are met with, the weaker and poorer they will be.

I will now pass to the descriptions of new Hydroids.

Oorhiza, nov. gen. (Pl. XV. figs. 7–11.)

Hydrorhiza a continuous layer consisting of a mass of anastomosing tubes, covering the shells of Gasteropods. From its surface rise spines and sexual and nutritive individuals. Trophosome cylindrical, with a single whorl of filiform tentacles. The sporosacs rise directly from the hydrorhiza, without the intervention of blastostyles.

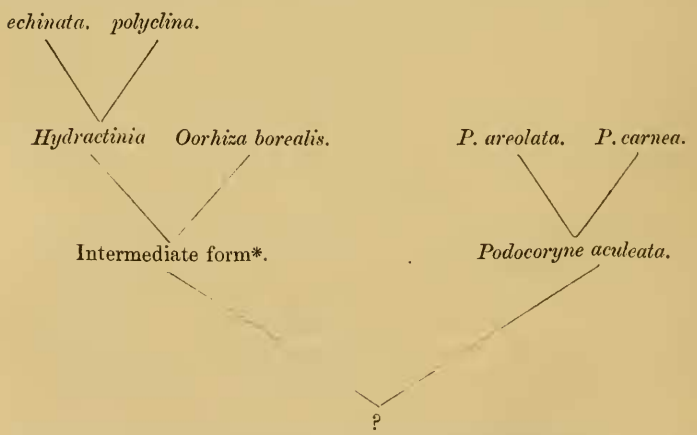
As will be seen from the character of this genus, it must undoubtedly be placed in the family Hydractiniidæ, which appears at once from the habit of this Hydroid. The continuous layer of the hydrorhiza, the spines, and the long and

* Ann. & Mag. Nat. Hist. 1874, vol. xiii. p. 147.
† Zeitschr. für wiss. Zool. vol. xiii. p. 560.

slender hydranths, all unmistakably recall a *Hydractinia* or a *Podocoryne*; so that from the trophosome alone it is impossible to distinguish *Oorhiza* from one of the above-mentioned genera. But the sexual individuals (gonosomes) present such characteristic peculiarities that it is impossible to place the Hydroid in question in any of the known genera of Hydractiniidæ. *Podocoryne*, as is well known, has the gonosomes consisting of blastostyles upon which Medusæ are produced; *Hydractinia* differs in that the same blastostyles give origin to sporosacs; lastly, *Oorhiza* has no blastostyles at all, but the sporosacs rise from the hydrorhiza itself.

It is true that in *Podocoryne* the presence of the blastostyles is not a constant character: their absence, indeed, is constant in *Podocoryne areolata*; in others, as for example *Podocoryne aculeata*, there may or may not be a blastostyle; and, finally, in *Podocoryne carnea* the Medusæ are constantly produced upon blastostyles. But this does not apply to the genus *Hydractinia*, in which the presence of blastostyles is a perfectly constant character and essential to the genus.

The genealogical relations between the genera and species of the family Hydractiniidæ may be expressed by the accompanying diagram:—



* This hypothetical intermediate form must have existed *analogically* with *Podocoryne aculeata*; it must have possessed indifferently sporosacs on blastostyles and without blastostyles: on one side *Hydractinia* was developed (analogically with *Podocoryne carnea*); on the other *Oorhiza* (analogically with *P. areolata*). If ever this hypothetical form is found, it will be necessary to unite the genera *Hydractinia* and *Oorhiza* into a single one, or else to establish a distinct genus for *Podocoryne aculeata*, which can by no means be done.

Oorhiza borealis, nov. sp. (Pl. XV. figs. 7–11.)

Trophosome.—The continuous layer of the hydrorhiza is furnished with fine spines in the form of elongated cones. The body of the hydranth, of a pale rose- or flesh-colour, has the form of an elongated cylinder. The number of tentacles varies from six to ten; their length is not equal, in consequence of different states of contraction.

Gonosome.—The gonozooids are placed very close together and in great numbers, and in consequence of their spherical form give the surface of the hydrorhiza a tuberculose aspect. Each gonozooid consists of a short spadix rising directly from the hydrorhiza, and a single ovum placed at the extremity of the spadix.

Locality.—The neighbourhood of the island of Solowetzky, at a depth not greater than 10 fathoms.

The spadix widens at its upper extremity; and it is upon this dilated part that the ovum is placed, as if upon a plate (fig. 8). A single spadix never bears more than one ovum, which may be of different sizes, sometimes very considerable, which proves that the ovum may grow up to a certain point—after which the absorption of nourishment changes the process of growth into a process of multiplication; the segmentation of the ovum commences. In the granular contents of the ovum a pale nucleus is always observed, and frequently a nucleolus. It would appear from M. Wagner's drawings that the ovum is surrounded by a layer of ectoderm (Pl. XV. fig. 8), the same ectoderm that covers the spadix, so that the ovum is placed between the ectoderm and the endoderm. The number of tentacles is very variable; but the numbers most frequently met with are those produced from 2, such as 6, 8, and 10, which leads us to regard 2 as the fundamental number of the Hydroids (fig. 7).

The tentacles of *Oorhiza borealis* present facts of very great importance. Their surface at the end (Pl. XV. fig. 11) is not smooth; it is mamillated, and the mamillæ give origin to something like secondary tentacles, or, rather, like pseudopodia. They consist of short, but not very fine, colourless, transparent, structureless cylinders, which spring from the surface of the mamillæ usually in groups of three or four together. These pseudopodia move very slowly; and M. N. Wagner has seen them issue and disappear just as in the *Amœbæ*. Moreover he has seen issuing from the surface, but also very slowly, larger and thicker protuberances, which became more and more rounded and inflated, and at the same time became constricted, so that they remained attached to

the tentacle only by a very thin peduncle (Pl. XV. fig. 10). In the interior there was to be seen a yellowish mass, the nature of which could not be ascertained by M. N. Wagner. At the same time the surface of this little sphere or protuberance gave origin in its turn to cylindrical pseudopodia, exactly of the same kind as those which were produced by the surface of the tentacles. These protuberances move slowly, and are put forth and disappear under the eyes of the observer. M. N. Wagner has communicated to me the interesting fact that, on making thin sections across the brain of the frog, previously hardened by freezing, it has been observed under the microscope that after the nervous substance was thawed, it began to move after the fashion of the *Amœbæ*, and thus changed its place, just in the same way as the protuberances of *Oorhiza* which I have just described. M. N. Wagner thinks that there is an analogy between these two facts, and supposes that these protuberances may be of a nervous nature, although certainly but little differentiated.

In one of the ends of tentacles of *Oorhiza* figured by M. Wagner, I observe the presence of pigment dispersed in the form of red granules of different sizes among the trichocysts (Pl. XV. fig. 9). The presence of these in a spot to which they could not be conveyed by the current of digestive fluid (they are placed principally close to the surface of the end of the tentacle), as also their habit, which greatly reminds us of the pigments which are met with in the eyes of the Medusæ (e. g. *Syncoryne Sarsii*), leads me to believe that we really have to do here with the first commencement of the organ of sight, which certainly could hardly choose a better place than the tips of the tentacles. This explanation of the pigment in question is placed absolutely beyond doubt and has become a proven fact for every one who has read the brilliant article, "Die Organ-Anfänge: I. Seh-Organ," by M. G. Jäger, which appeared in the second part of the new German periodical 'Cosmos' *. M. Jäger treats the question of the forms under which the organs of sight must appear in the animal kingdom, and proves with marvellous clearness that the first indications of these organs must consist in a part of the protoplasm becoming pigmented (red, green, &c., and subsequently black), which retains the light and transforms the molecular movement produced by it into sensation of light, while the non-pigmented protoplasm, allowing all the light to pass through it, cannot feel the sensation of light. Thus not

* Cosmos: Zeitschrift für einheitliche Weltanschauung auf Grund der Entwickelungslehre in Verbindung mit Ch. Darwin und E. Häckel, 1877, May, p. 94.

only the Medusæ, but also the Hydroids, possess organs of sight.

Oorhiza is always seated upon the shells of Gasteropods, especially *Buccinum undatum* and *Fusus despectus*, in large colonies, near the island of Solowetzky, most frequently at a depth of 5–8 fathoms.

Prof. M. Wagner, who first found, examined, and figured it, has most kindly furnished me with all his facts and drawings, some of which are represented in Pl. XV. It is from these drawings that I have prepared the description of the Hydroid.

Leptoscyphus Grigoriewi, nov. sp. (Pl. XIV. figs. 1, 2.)

A small branching colony. The branches which bear the hydrothecæ with their pedicels are regularly and slightly angularly bent and slightly ringed, especially above each angle. The pedicels which support the hydrothecæ are short, never exceeding half the length of the hydrotheca, and are much more strongly ringed than the branches. They are very regularly arranged alternately upon the branches, and always issue from the angle formed by the branch. The hydrothecæ are of an elongated form, in the shape of two cones, of which the inferior is the larger, and the upper, smaller one is divided into lobes, which form an operculum; this division is not deep, never exceeding $\frac{1}{3}$ of the length of the whole hydrotheca.

The gonophores are unknown.

Locality.—The colonies were found seated upon an Ascidian which is very widely distributed in the White Sea, in the Bay of Onega, at the mouth of the river Kem, in 34° 55′ of longitude, at a depth of 5 fathoms, on a muddy bottom, July 5, 1875.

The position that I have assigned to this Hydroid, in the genus *Leptoscyphus*, is only provisional; it might equally well be placed in the genus *Campanulina*, which only differs from *Leptoscyphus* in the gonophores, with which I am unacquainted here. In regard to its specific distinctness, there can be no doubt that the Hydroid in question constitutes a new species, which I have called *Leptoscyphus Grigoriewi*, in honour of my travelling companion, the botanist, A. W. Grigoriew.

This species is distinguished principally by the form of the hydrothecæ, which have the segments of the superior cone not very deep, usually less than one third of the total length of the hydrotheca. This distinguishes it from *L. tenuis*, Allman, with which it has many resemblances. The lower part of the hydrotheca narrows regularly (Pl. XIV. fig. 2, *b*);

but frequently individuals are met with in which this part diminishes very little, and thus acquires a nearly cylindrical form (Pl. XIV. fig. 2, *a*). Another characteristic feature is the shortness of the pedicels which support the hydrothecæ, and which are a little less than half the length of the hydrotheca, whilst in *L. tenuis* the pedicel is longer than the hydrotheca. The annulation is pretty well marked, but far from attaining the development observed in *Campanulina repens*, which is further distinguished from *Leptoscyphus Grigoriewi* by the mode of ramification and the form of the hydrotheca. In our species the annulation is clearly marked only in the pedicels, and on the branches above the points of insertion of the latter. The colour of the branches is especially distinct at the base of the colony, where it is a dull brown; it becomes lighter and lighter towards the middle, and finally disappears at the extremity. The hydrothecæ are always colourless.

Length of the hydrothecæ (average) 0·34 millim., length of the superior cone 0·1, maximum breadth of the hydrotheca 0·091, length of the pedicel 0·15, breadth of the branches 0·065.

Sertularella gigantea, mihi. (Pl. XIV. figs. 6, 7.)

Sertularia polyzonias, Linn., var. *robusta*, Sars, "Bidrag til Kundskaben om Middelhavets Litoral-Fauna," in Nyt Magazin for Naturvidenskaberna, 1857, p. 163.

Sertularia polyzonias, Linn., *polyzonias* (ex parte), Hincks, Hist. Brit Hydr. i. p. 235.

Sertularia polyzonias, Linn., var. *gigantea*, Hincks, "On Deep-water Hydroida from Iceland," Ann. & Mag. Nat. Hist. ser. 4, vol. xiii. (1874), p. 151, pl. vii. figs. 11, 12.

Sertularia polyzonias, Linn., var. *gigantea*, Hincks, S. Smith and O. Hagen, "Report on the Dredgings in the Region of St. George's Banks in 1872," Trans. Conn. Acad. of Arts and Sciences, iii. part i. (1876), p. 53.

The tolerably flexible stems spring from the branched hydrorhiza often without ramifying; sometimes they divide at their base into two or three branches, each of which may again ramify once more; the terminal branches are in all cases very long and straight. The hydrothecæ are evidently alternately arranged upon the angularly bent stem; frequently we observe three or four undulations (ribs) crossing the hydrotheca; its form is much elongated, only a little widened at its base; in size it is two or three times the length of the hydrotheca of *S. polyzonias*. In adult individuals the margins are always furnished with several ledges, and an equal number of small opercula placed one above the other. Below each hydrotheca the stem is slightly ringed.

Gonophores unknown.

Localities.—1. Island of Solowetzky, on a *Balanus* (depth unknown) ; 2. Not far from the Orlow promontory, 67° 17′ N. lat. and 41° 35′ E. long., at a depth of 35 fathoms on a gravelly bottom, attached to *Flustra* (June 28) ; 3. Glacial sea, Mourmansky bereg, Gaurilowo, Stanowischtjé (from M. Danilewsky, in the collection of the Museum of the Academy of Sciences of St. Petersburg).

This species has long been known ; but M. Sars and Mr. Hincks have regarded it as simply a polar variety of *Sertularella polyzonias*. Nevertheless, even by its appearance to the naked eye, by the habit, it is always very easy to distinguish this species from every other species of the genus *Sertularella*; and this distinction is produced principally by the enormous hydrothecæ, which are often twice the length of those of *S. polyzonias*. And besides all this, it must be taken into consideration that, among all the Hydroids of my collection, I do not find a single one that presents a form intermediate between *S. polyzonias* and *S. gigantea*, which I possess from three different localities. Hence this character is very constant, and is characteristic of the northern seas. Neither Mr. Hincks, nor M. Sars, nor MM. Smith and Hagen say a single word as to intermediate forms; so that I am led to regard the var. *gigantea* of *S. polyzonias* as a distinct species, as constant as any other, and having characters sufficiently salient to enable it to be recognized with facility. Besides its size, this species is further characterized by the form of the hydrothecæ, which are much elongated and often have three or four ribs, by the margin, which is always adorned with several (sometimes eight or even ten) ledges, giving it a very peculiar aspect, and, lastly, by the mode of ramification. All this will be better understood from figs. 6 and 7 of Plate XIV., especially if these drawings be compared with that of *S. polyzonias* given by Hincks*.

Usual length of the colony 3–4 centims. Length of the hydrotheca 1·3 millim., its breadth 0·52 ; space between two successive hydrothecæ along the stem 0·63.

Sertularia albimaris, nov. sp. (Pl. XIV. figs. 3–5.)

Hydrorhiza composed of a continuous layer, produced by the confluence of an ordinary ramified hydrorhiza in a single plane ; so that the thickness of the layer does not exceed the diameter of the tubes of the hydrorhiza. The surface of this

* Hincks, Hist. of Brit. Hydr. pl. xlvi. fig. 1. I have *Sertularella polyzonias* from the Black Sea ; so that I have been well able to compare the two species ; and it is strange that Mr. Hincks did not find it possible to separate these two very different forms.

layer is furnished with small spines. The principal stem is very wide; it gives origin to slenderer branches, arranged alternately and regularly in a single plane, so that the whole acquires the aspect of a feather. The lateral branches may divide dichotomously at their extremities. The position of the hydrothecæ is not exactly opposite; their form is not very characteristic; the summit is a little compressed and notched, so as to form two points.

Gonophores unknown.

Locality.—The narrow part of the White Sea (Gorlo), between the river Ponoy and the island of Morjowetz, in 66° 55′ N. lat. and 40° 45′ E. long., at a depth of 20 fathoms, on a gravelly bottom (June 28, 1876)?. I am not quite sure that the ticket attached to this Hydroid is the right one.

This is undoubtedly one of the most singular and interesting species of the genus *Sertularia*; and, indeed, if the differences presented by the hydrorhiza are increased by those of the gonophores, it will be necessary to form a distinct genus for it. What most characterizes it is the hydrorhiza, which is composed of a rather thin layer, giving origin at its surface to several colonies in the form of pretty bushes, so that the whole resembles a little shady thicket. Under the microscope it is seen that the hydrorhiza is adorned with an irregular branching pattern, formed by partitions which are nothing but the lateral walls of the tubes of the hydrorhiza, which has become a continuous layer by means of these walls (Pl. XIV. fig. 5). This is the reason why we always notice that the partitions seen in profile have a line in the middle, which is caused by these partitions being formed by two lateral walls belonging to two neighbouring tubes, which are thus united. Both the upper and lower layers of chitine, between which the partitions are placed, are nothing but the upper and lower walls of the original tubes. Thus we see that the hydrorhiza is formed of several ramified tubes, which have become fused together by their lateral walls; these lateral walls, after having joined in growing, form the pattern already mentioned (figs. 5, 6), whilst the upper and lower walls constitute the upper and lower continuous membranes, between which the pattern is placed. There are spots at the margin of the hydrorhiza where this process is still continuing; and here it may all be seen perfectly.

So far as I know, there is not a single species, not only in the whole family Sertulariidæ, but generally among the Thecaphora, that has a hydrorhiza of this kind, which much resembles the hydrorhiza of *Hydractinia* or *Podocoryne*, but with the difference that in these latter the hydrorhiza is composed

of several layers superposed upon one another, whilst in *Sertularia albimaris* it only consists of a single layer.

As I have already said, the surface of the hydrorhiza bears processes of chitine in the form of long, slender cones, empty in the middle and without openings at the extremity (fig. 5, *a*). The length of these conical spines does not exceed 0·2 millim. These cones, which remind us of the spines in *Hydractinia* and *Podocoryne*, are not numerous. It is a very interesting fact that, in all the cases in which the hydrorhiza assumes the form of a continuous layer, this peculiarity is always combined with another, namely the existence of spines; and it would be interesting to ascertain the wherefore of this characteristic coincidence that exists between these two facts.

Another peculiarity presented by this Hydroid is that the principal stem (fig. 3) is very wide in one direction (it is compressed); and this width is not induced by the size or breadth of the hydrothecæ, but by the central portion which bears the hydrothecæ, which gives the colony a very peculiar habit. The width of the lateral branches is much less. The hydrothecæ are a little compressed at the end, not, however, in the same direction as the principal stem, but in a direction perpendicular to this; and their orifice is notched so as to form two teeth. In general form they remind us of those of *Polyserias mirabilis*. Sometimes, however, hydrothecæ occur with very elongated necks bent to one side. Two or three pairs of hydrothecæ (sometimes, especially on the principal stem, a single pair) form an articulation which may easily be detached. The position of the hydrothecæ is more or less opposite, more alternate on the lateral branches than on the principal stem; but even then it is easy to group them in pairs; so that, according to M. Kirchenpauer, it would be necessary to arrange this species in the genus *Dynamena*; but, considering the insignificance and the want of clearness of this distinction, I prefer to retain the English terminology.

Length of the colony 16 millims.; breadth of the principal stem (measured between the outermost summits of two opposite hydrothecæ) 0·8, the same breadth in the lateral branches 0·60–0·73; length of the hydrothecæ 0·43, their breadth 0·17; length of the spines 0·2.

Polyserias, nov. gen.

This genus, belonging to the family Sertulariidæ, forms a very peculiar type among the Hydroids of the order Thecaphora, by reason of the arrangement of its hydrothecæ. Except *Salacia abietina* and *Campanularia verticillata*, there

exists no Thecaphorous Hydroid in which the hydrothecæ are arranged in more than two rows; but even in the above two species the apparent arrangement in several rows is, fundamentally, the result of the stem being composed of as many smaller stems amalgamated together as there are rows of hydrothecæ; so that here the number of rows is only apparent. But in all the Hydroids in which the stems are not complex the hydrothecæ are arranged either in two rows, as in *Sertularia*, *Thuiaria*, &c., or in a single one, as in *Plumularia*, *Aglaophenia*, *Hydrallmania*, &c. In *Polyserias*, on the contrary, although in all other respects it differs but little from *Sertularia* or *Thuiaria*, the arrangement of the hydrothecæ in several (6, 8, 10) longitudinal rows is a character that occurs without the stem being composite. This multiserial arrangement gives a perfectly peculiar aspect to all the species of *Polyserias*: the branches become thick, round, and longitudinally striated; the colonies are usually large, and the branches long. It is characteristic of the whole genus, that on the principal stem the arrangement of the hydrothecæ is, as usual, biserial.

The gonosomes are not very different from the gonophores of *Sertularia* or *Thuiaria*, except that their arrangement may also be multiserial, like that of the hydrothecæ.

When I gave a short description of the genus *Polyserias* in this journal some months ago*, I knew nothing in literature upon this type of Hydroids. Since the publication of my description there has appeared the third part of the 'Proceedings of the Academy of Natural Sciences of Philadelphia,' in which Mr. Clark, in a memoir upon the Hydroids of the Aleutian Islands, describes two species of Hydroids which undoubtedly must be placed in my genus *Polyserias*. Unfortunately the author has not paid sufficient attention to the significance of the multiserial arrangement of their hydrothecæ, and has ranged one of them in the genus *Diphasia*, and the other in *Thuiaria*. It is evident that this view must give place to mine, according to which all the forms should be united in a single genus, *Polyserias*. It was, moreover, only from this memoir that I learned that this polyserial form was described by Mr. Verrill, under the name of *Diphasia mirabilis*, as long ago as 1872, in the 'American Journal,' and subsequently in a Connecticut journal; and I do not think I am mistaken in identifying *Diphasia mirabilis*, Verrill, with my *Polyserias Hincksii*†.

* Ann. & Mag. Nat. Hist., Sept. 1877.

† For the references to these citations see the synonymy of *Polyserias mirabilis*.

Polyserias mirabilis, Verrill. (Pl. XV. figs. 5, 6.)

Diphasia mirabilis, Verrill, Amer. Journ. Sci. vol. v. (Dec. 1872), p. 9; S. Smith & O. Hagen, Trans. Conn. Acad. of Arts & Sci. vol. iii. pt. i. (1877), pp. 219, 225; Clark, Proc. Acad. Phil. 1877, pt. iii. p. 219, pl. xiii. fig. 36.

Polyserias Hincksii, Mereschkowsky, Ann. & Mag. Nat. Hist. vol. xx. (1877) p. 228, pl. vi. figs. 15, 16.

Colony rigid, plume-like, attaining a length of 16 and a breadth of 6 centims. The principal stem is angularly bent, and only bears two series of hydrothecæ; from each angle issues a long and straight branch which is never ramified; the arrangement of the branches is regular, alternate, and in the same plane; they are of equal length to [near] the extremity, where they become shorter. Sometimes, especially in the largest colonies, the stem gives off from its two lower bends, not, as usual, a single branch, but [two or more] branches, which issue simultaneously from the angle formed by the principal stem; and in this very rare case each pair of branches is not arranged in the same plane as all the other branches. Each branch is attached by means of a short peduncle, and forms with the principal stem an angle of about 45°. The hydrothecæ upon the branches are always arranged in six distinct and regular rows, even to the ends of the branches, which terminate abruptly. The transverse section of the branch, if it is rather slender, only shows three cells around the central cavity; but on making the section a little higher up, we obtain three other cells, placed, not directly above the former, but between them in the interstices—which proves that we have to do with six rows, and that at the same time two hydrothecæ belonging to two rows are not placed side by side, but sometimes higher, sometimes lower (that is to say, alternately). This will be better understood by examining the drawing which I have already given*. The form of the hydrothecæ is that of those of the *Sertulariæ* in general, furnished with a pretty long neck inclined outwards and slightly flattened, and with a wider part united with the stem. The aperture of the hydrotheca is operculate and furnished with two very distinct teeth placed at the corners of the orifice, which, in consequence of the compression of the neck, is elongated.

The gonophores in their young state have the form of a reversed cone attached by its apex (Pl. XV. fig. 5); but in the completely developed state they differ very little from the gonophores of *Sertularia* or *Thuiaria*. Their form is elon-

* Ann. & Mag. Nat. Hist. 1877, vol. xx. pl. vi. fig. 16.

gate oval, narrowed below into a short peduncle, and abruptly truncate at the extremity above, where they are narrowed into a sort of wide and very short tube. The arrangement of the gonophores upon the branches may be in four rows; and frequently they are in such great numbers and so close together that they compress one another and then acquire an irregular form. When looked at from above they then have the appearance shown in the accompanying figure (fig. 10).

Fig. 10.

This species, which I only describe very briefly now, was at first named by me *P. Hincksii*; but as I have since convinced myself that it was described several years ago under the name of *Diphasia mirabilis*, the laws of priority compel me to change the name, and to call it *Polyserias mirabilis*. At the same time I shall change the name of another *Polyserias*, which I have briefly described as *P. glacialis*, and I shall give it the name of *P. Hincksii*, in honour of the Rev. Thomas Hincks. The description of this species will follow immediately.

It must be remarked that *Polyserias mirabilis* is one of the most magnificent, and, at the same time, one of the largest species that have been met with in the White Sea. Nor can I say that it is rare, as I have several specimens of it from several localities. The largest specimens, which have only retained their branches in the upper part, measure nearly 16 centims. Their colour is a rather dark brown, darkest especially on the principal stem and at the ends of the lateral branches. The length of the branches is from 1 to 2 centims., and their width about 1·1 millim. Length of hydrothecæ 0·55 millim., their breadth 0·48; length of the mature gonothecæ 1·1 millim., their breadth 0·63.

This species, as indeed the whole genus, is purely polar, and apparently even circumpolar.

Localities.—1. The island of Solowetzky, near the monastery, at a small depth (not more than 15 fathoms); 2. Near the promontory of Orlow (White Sea), 67° 17′ N. lat. and 41° 35′ E. long., at a depth of 35 fathoms, on a gravelly bottom, June 28, 1876 (gonophores present); 3. Glacial Ocean, N.E. of the Swiatoy Nos (the Holy Nose), on the Mourmansky bereg, 68° 13′ N. lat. and 40° E. long., at a depth of 60 fathoms, on a bottom of sand and shells, June 30 (the best specimens, with many gonophores).

Polyserias Hincksii, nov. sp. (Pl. XV. figs. 1–4.)

Polyserias glacialis, Mereschk. Ann. & Mag. Nat. Hist. vol. xx. (1877) p. 228.

Colony rather rigid, plumiform, attaining a length of 20 centims. and a breadth of 10 centims. The principal stem is angularly bent, and only bears two kinds of hydrothecæ. From each angle issues a branch, which at first forms with the main stem an angle of about 45°; but afterwards this angle enlarges more and more until the position of the branch becomes vertical to the main stem. The branches are long, cylindrical, attain a length of 6·5 centims., and become shorter in proportion as they approach the apex of the colony. They are attached by means of a short and slender peduncle; their arrangement is alternate and in the same plane (Pl. XV. fig. 1). The hydrothecæ upon the branches are always arranged in six rows, as in the preceding species, and in the same alternate manner; but here each pair of rows (fig. 2) forms a distinct system, separated by a small interval not occupied by hydrothecæ. The roundness of the branches is more distinct in this species, as also the rows of hydrothecæ. The thickness of the branches is very considerable, and still greater in the youngest. The hydrothecæ are oval, a little wider below, with a more or less regular oval aperture; they are immersed in the stem for their whole extent, and their neck does not project outwards. In the lower part of the hydrothecæ there is a small tube, which constitutes the communication between the hydrotheca and the central canal which traverses the whole length of the branch. Colour of the branches pale yellow, that of the main stem dark brown; the points of the branches are not of darker colour as is usual in *P. mirabilis*.

Gonophores in the young state (fig. 4) in the form of a reversed cone, just as in *P. mirabilis*, but generally smaller. In the adult state (fig. 3) they retain their conical form, but the cone becomes larger and more elongated; below, it is attached by a short peduncle; above, it is truncate with the margins much rounded, and furnished with a tube of very inconsiderable length, which is scarcely observable, and much narrower than in the preceding species. The gonothecæ of this species are never present in such abundance as in *P. mirabilis*.

This species, the largest that I am acquainted with in the White Sea, is distinguished from the preceding by the greater breadth of the colony, due to the extreme length of the lateral branches, by the much lighter colour, and especially by the stout, cylindrical form of the branches, the surface of which is

completely smooth, in consequence of the form of the hydrothecæ, which more approaches that occurring in *Thuiaria*, being entirely immersed in the chitinous substance, while the outwardly curved necks of *P. mirabilis* give a hispid aspect to its branches.

Width of the branches of the middle of the colony 0·75 and 0·85 millim., of the uppermost branches 1·10 millim. ; length of the hydrothecæ 0·52 millim. (at the end 0·57), their breadth 0·34 millim. (at the end 0·45) ; length of the gonothecæ 0·9 millim., their breadth 0·5.

This species, which is a still more magnificent one than the preceding, is not more rare; but it is especially from the Glacial Ocean (near the Swiatoy Nos) that I have collected the largest and most luxuriant specimens.

Localities.—1. White Sea, near the promontory of Intzy (on the Zimnij bereg), in 66° N. lat. and 40° 25′ E. long., at a depth of 10 fathoms, on a stony bottom, June 23 (without gonophores) ; 2. Glacial Ocean, N.E. of the Swiatoy Nos, upon the Mourmansky bereg, in 68° 13′ N. lat. and 40° E. long., at a depth of 60 fathoms (the large specimens), upon a bottom of sand and shells, June 30, 1876 (with gonophores).

Propositions.

The following are the fifteen propositions, contained in the present memoir, which, I think, I can sustain and defend :—

1. Forms like *Syncoryne*, *Coryne*, *Gemmaria*, *Stauridium*, *Cladonema*, *Millepora*, &c. form a type which I name the articulate type ; all these forms are governed by the *law of metamerism*.

2. Articulation is produced by incomplete transverse division.

3. The very large number of metameres is produced by the law of physiological inertia of N. Wagner.

4. The articulate form in the Hydroids is almost always accompanied by capitate tentacles ; this form is the best adapted to fulfil the function of defence, the only function that remains to them when their position has become too distant from the mouth.

5. The exceptions to this rule may be perfectly well explained, and by no means contradict proposition 3.

6. The hydranth with its tentacles may be regarded as a polymorphic colony (tentacles and body) composed of several *Archhydræ*, Häck., produced by the process of gemmation. The tentacles are not the homologues of such organs as feet, hands, &c. ; they are only their analogues.

7. The medusa of *Obelia flabellata* is developed in the manner ascertained by F. E. Schultze in the case of *Syncoryne Sarsii*, in the first place by the impulsion of the active ectoderm into the passive endoderm.

8. The first stages of the development of the ova of the medusa of *Obelia flabellata* before fertilization consist in a repeated division of the *nucleolulus*, followed by the division of the *nucleolus* into several parts, a division which stops at the *nucleus*.

9. *Obelia flabellata*, under certain conditions, appears to be able to increase by spontaneous fission by a sort of cyst, after the fashion of *Schizocladium ramosum* and *Corymorpha*.

10. There are more than forty species of Hydroids in the White Sea, about eight of which are new. The fauna is more polar than that of the north of Norway and the Mourmansky bereg, and shows some oriental features (*i. e.* features of the fauna of the Pacific Ocean). It does not prove Lovén's hypothesis of a connexion between the White Sea and the Baltic.

11. *Oorhiza borealis*, nov. gen. et sp., is distinguished by the sporosacs issuing immediately from the hydrorhiza without the intervention of blastostyles.

12. There are Hydroids (*Oorhiza borealis*) the tentacles of which are furnished with eyes (or "eye-pigment").

13. The northern variety of *Sertularella polyzonias* must constitute a distinct species—*Sertularella gigantea*, mihi.

14. *Sertularia albimaris*, new species, with a hydrorhiza in a continuous layer. Description of *Leptoscyphus Grigoriewi*, nov. sp.

15. The forms of the family Sertulariidæ, which have their hydrothecæ arranged not in two but in several series, must form a new genus, *Polyserias*. (Description of two species.)

EXPLANATION OF PLATES.

Plate XIII.

Fig. 1. Young medusa of *Obelia flabellata* in the form of *Archhydra*.

Figs. 2, 3. Subsequent stages of development, in which the ectoderm alone is active and buries itself in the endoderm.

Fig. 4. Optical section of fig. 5.

Fig. 5. The four radial canals, strongly developed; commencement of the formation of the manubrium.

Fig. 6. Young medusa still attached to the blastostyle.

Fig. 7. Medusa of *Obelia flabellata*, completely developed and furnished with four sporosacs.

Figs. 8, 9. 10. Ova taken from the sporosacs of the medusa of *Obelia flabellata*, not fecundated, and showing different stages of development of the nucleolus and nucleolulus.

Fig. 11. The nucleus, highly magnified, to show the relative size of the

nucleolulus and its irregular, variable form: *n'*, nucleus; *n''*, nucleolus; *n'''*, nucleolulus.

Figs. 12, 13. More advanced stages of the development of the ovum, associated with an enlargement of the ovum.

Fig. 14. A second observed case of a nucleolus in process of division: *n''*, nucleolus.

Fig. 15. A nucleolus (*n''*), much magnified, with a nucleolulus (*n'''*) in the middle and an aureole of five small granules.

Fig. 16. The apex of a stem of *Obelia flabellata*, in which the cœnosarc has become detached as a cylinder with a cavity.

Fig. 17. A hydrotheca in which the cœnosarc has formed, instead of a cylinder, a sphere with a cavity, ectoderm, endoderm, and perisarc.

PLATE XIV.

Fig. 1. *Leptoscyphus Grigoriewi*, nov. sp., magnified, drawn with the camera lucida.

Fig. 2. Two varieties presented by the hydrothecæ of *Leptoscyphus Grigoriewi*, more highly magnified. Drawn with the camera lucida.

Fig. 3. *Sertularia albimaris*, nov. sp., principal stem and lateral branches. Enlarged; drawn with the camera lucida.

Fig. 4. A colony of *Sertularia albimaris*, natural size.

Fig. 5. Portion of the hydrorhiza of the same, much enlarged (camera lucida): *a*, the spines; *b*, the vertical partitions formed by the lateral walls of the tubes, which are joined in growing.

Fig. 6. *Sertularella gigantea*, mihi, natural size.

Fig. 7. The same, enlarged.

PLATE XV.

Fig. 1. A very fine colony of *Polyserias Hincksii*, nov. gen. et sp.

Fig. 2. Part of a stem of the same Hydroid, enlarged (camera lucida).

Fig. 3. A mature gonotheca of *Polyserias Hincksii*.

Fig. 4. A young gonotheca of the same.

Fig. 5. *Polyserias mirabilis*, with immature gonothecæ (camera lucida).

Fig. 6. A mature gonotheca of the same Hydroid.

Fig. 7. Part of a colony of *Oorhiza borealis*, nov. gen. et sp., enlarged, from a sketch by M. Wagner.

Fig. 8. Sporosacs of *Oorhiza borealis*, issuing from the hydrorhiza.

Fig. 9. Tip of a tentacle of *Oorhiza borealis* with pseudopodium-like filaments and red pigment grains (eye-pigment).

Fig. 10. A body on a peduncle, moving like an *Amœba*, and giving origin to filaments.

Fig. 11. Another tip of a tentacle, to show the arrangement of the filaments.

XXXVII.—*Descriptions of twenty new Species of* Hesperidæ *from his own Collection.* By W. C. HEWITSON.

Plesioneura Tola.

Alis utrinque nigro-fuscis: anticis fascia media, regulari, nervis albis quinquepartita, nivea.

Both sides dark brown. Anterior wing crossed in the